VARIATION IN STREAM CHEMISTRY ACROSS THE KANSAS PRECIPITATION GRADIENT

Abagael Pruitt[1], Janaye Hanschu[2], Emma Overstreet[3], Terrance Loecke[4], Lydia Zeglin[5], Samantha Thomas[6], Amy Burgin[7]

Introduction

Question: How do stream order, land use, and stream position within the precipitation gradient across Kansas affect stream chemistry?

Hypothesis: Land use will drive changes in stream chemistry that are biologically driven (e.g., DOC, NO_3^-), whereas stream order or position in the precipitation gradient will have a greater affect on conservative (e.g. Cl^- or Na^+) chemistry.

Take-Home Messages

Stream order was the most consistent factor for explaining variation in stream chemistry.

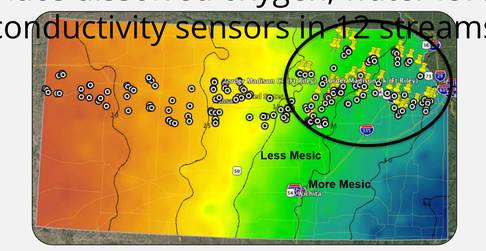
Land use never explained the highest amount of variation in stream chemistry.

Stream chemistry did not vary between Central and Eastern Kansas streams.

Future Work

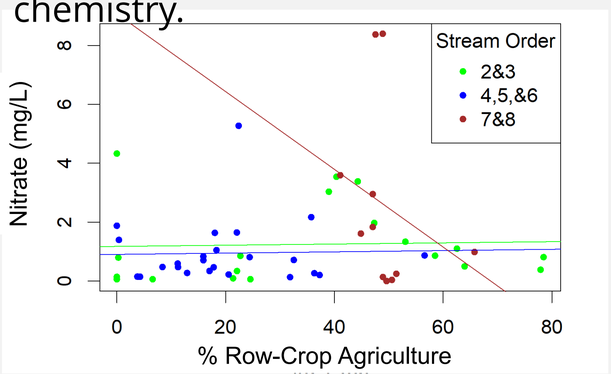
This summer we plan to:

- Sample streams across the whole state
- Sample streams of all orders
- Place dissolved oxygen, water level, conductivity sensors in 12 streams



2018 samples were concentrated in the Central and Eastern KS; drought precluded sampling any 1st order streams.

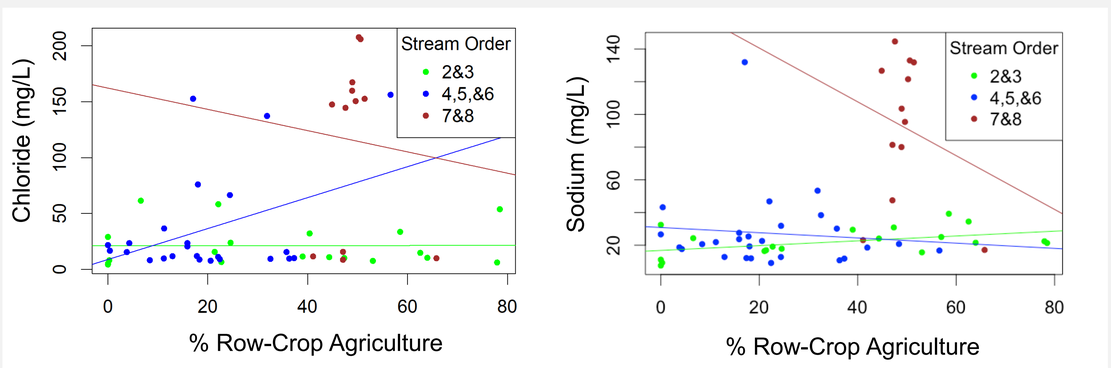
Nitrate



We hypothesized that land use would best predict variation in stream nitrate concentrations.

None of our three predictor variables explained a significant amount of variation in nitrate concentration.

Conservative Tracers (Chloride & Sodium)



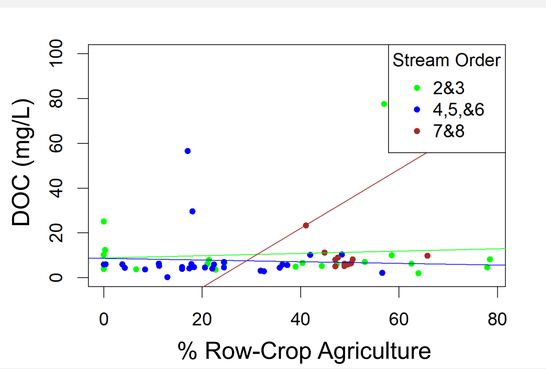
We hypothesized that stream order or position would best explain biologically conservative elements in stream chemistry.

For both chloride and sodium, stream order best predicted variation in stream concentrations, explaining 37% and 52% respectively.

For Sodium, % row-crop agriculture was of secondary importance.

Stream position was not an important factor for either element.

Dissolved Organic Carbon

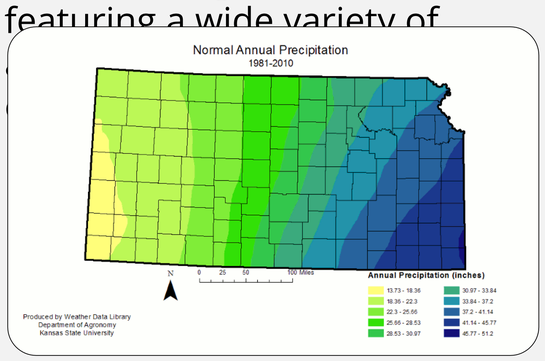


We hypothesized that land use would best predict variation in stream Dissolved Organic Carbon concentrations.

Stream order best predicted variation in DOC concentrations. Stream position and land use were not significant variables.

Background

Kansas has a precipitation gradient with the most arid climate in the west, and most mesic in the east. This precipitation gradient also manifests as a gradient of intermittent stream flow to perennial flow. Land-use also differs throughout the state featuring a wide variety of



Methods

- We collected water chemistry samples from 70 streams across Central and Eastern Kansas. These samples ranged from second-order streams to eighth-order rivers within the Kansas River watershed.
- We measured phosphorus (SRP), ammonia, and nitrate, as well as in-stream chemical parameters.
- Land use data was acquired via the NLCD 2011 project.
- We performed model selection on multiple stepwise regressions with the stream chemistry factor as the independent variable and land use, stream order, and stream position (more vs. less mesic) as dependent va

Measuring discharge

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A 3rd order stream in Eastern KS

Acknowledgements

We thank the Burgin/Loecke lab and its members, as well as members of the Zeglin lab and Dr. Matthew Kirk for running the cation chemistry. This research is funded by Kansas NSF EPSCoR (OIA-1656006).

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Abstract: How do stream order, land use, and stream position within the precipitation gradient across Kansas affect stream chemistry? Land use will drive changes in stream chemistry that are biologically driven (e.g., DOC, NO3-), whereas stream order or position in the precipitation gradient will have a greater affect on conservative (e.g., Cl- or Na+). Take home message is stream order was the most consistent factor for explaining variation in stream chemistry. Land use never explained the highest amount of variation in stream chemistry. Stream chemistry did not vary between Central and Eastern Kansas streams.

Keywords:

Surface water chemistry, nitrate, phosphate, dissolved organic carbon